

Remarks

Applicants would like to thank the Office for allowing claims 16 and 22 to 25.

35 USC 102(b) Rejections

On page 2, the Office continued to reject claim 26 under 35 U.S.C. 102(b) as being anticipated by US 5,717,132 (Watanabe et al., hereinafter "Watanabe").

In particular, the Office continued to express the opinion that Watanabe "movable arm" 19 constitutes a "rigid support" as set forth in the present claims.

The Office also disagreed with applicants' argument that Watanabe's movable arm 19 is not part of his cantilever assembly as required by claim 26, but part of a fixture to releasably hold the cantilever assembly when in use. The Office in particular stated that an apparatus claim, here claim 26, is defined by its structure and not by its intended use and expressed the opinion that, as currently written, claim 26 only requires the cantilever to be mounted to a rigid support on the back side of the cantilever. The Office refers to numerals 19 ("movable arm") and 20 ("stationary arm") of Watanabe (see, e.g., Fig. 9).

Applicants submit that, during examination, a term has to be given the "broadest reasonable interpretation consistent with the specification" (MPEP 2111). Here, the Office gives the term "rigid" a rather narrow interpretation by confining the "rigidity" to the material of which the support is made, rather than considering it also a description of the relationship between the support and the cantilever. However, applicants respectfully submit that such an interpretation is not consistent with the specification as required by the MPEP. The specification clearly indicates that the reference to a rigid support describes the relationship between the support and the cantilever. The Office is respectfully directed at all the Figures as well as the description, e.g., para. [0054] of the publication where the specification discusses the recessed partly-octagonal shape

of step 120 of the support and describes it as sufficiently stiff (since step 120 has sufficient mass) in order to form a “rigid support” for cantilever 10.

Thus, the specification makes clear that the term “rigid support” describes the rigidity of the support relative to the cantilever.

However, the Office’s attention is also directed at new claims 28 and 29, which are supported by para. [0043] and [0044] of the publication as well as Fig. 1 (claim 29).

35 USC 103(a) Rejections

On page 3, the Office continued to reject claims 10 to 13, 17 and 21 under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,265,863 to Kajimura et al. (hereinafter “Kajimura”) in view of “Small Cantilevers for Force Spectroscopy of Single Molecules” by Viani et al.(hereinafter “Viani”).

Applicants previously argued that the teaching of Kajimura, who discloses regular sized cantilevers with a reflective area at the “back side” facing away from the sample could not be readily combined with the small size cantilever of Viani in which a reflector pad is provided on the “front side” facing towards the sample to be scanned.

On page 9 of the Action, the Office requests clarification as to what applicants means by front and back side. However, the Office interprets applicants’ argument correctly in that the “front side” of the cantilever faces the sample. From here, the Office moves on to examine the contents of Viani and states that the Office could not find any evidence that Viani indeed discloses a reflector pad at such a front side, which constitutes the basis of applicants non-obviousness argument. In fact, the Office argues that both Viani and Kitamura disclose a reflector pad on the side of the back side, ergo the side facing away from the tip/sample (see sentence bridging pages 9 and 10 of the Action).

As outlined in detail below, applicants respectfully disagree with the Office’s interpretation of Viani.

However, firstly, to respond to the Office concerns with regard to the claims' clarity, applicants have amended independent claims 10 and 21 to add to the already present explanatory phrase, which describes the back side as "facing away from the sample", an explanatory phrase for the front side, namely that this front side is facing the sample. This amendment is supported throughout the specification, e.g., in para. [0018] or para. [0044] of the publication.

Secondly, applicants will explain and show herein that Viani's reflective pad is indeed provided at the front side on the front side facing towards the sample and how the so positioned reflector pad interacts with the sample surface. Applicants will also explain why the pictures of Viani support that the reflector pad and the cantilever tip are on the same side of the cantilever.

Applicants will thus show that the Office's conclusion that Kitamura and Viani both disclose application of a reflective pad on the side of the cantilever opposite of the tip, ergo facing away from the sample and thus the Office's basis for this obviousness rejection is erroneous (see page 9 of the Action).

Viani's Figure 1 and corresponding description discloses that their gold reflector pad is arranged on what is calls the "cantilever side" of the wafer which corresponds to the bottom side of the wafer as well as of the cantilever shown in Figure 1. The opposite side of the cantilever is the top side of the cantilever shown in Figure 1. At this top side the cantilever is attached to its support (in this case the support being a part of the single crystal silicon wafer fixed to the cantilever). Figure 1e shows the cantilever assembly in a fabrication stage before separating the cantilever assembly from the remaining wafer by etching (see the sentence bridging the two text columns on page 2259). The cantilever tip is not yet assembled on the cantilever end at this stage, but is assembled afterwards, e.g. by electron beam deposition as mentioned in the text provided for Figure 2(b). As apparent to the person skilled in the art, this cantilever tip is then assembled on the wafer cantilever side, i.e., on the bottom surface of the cantilever as shown in

Figure 1e. This is clear since on the opposite cantilever side, i.e. the top side of the cantilever in Figure 1e, the cantilever support (i.e. the corresponding wafer part) is attached to the cantilever, where the support has a thickness significantly higher than typical cantilever tip extensions. For example, in Figure 1 the wafer support is 300 μm thick which is significantly higher than the typical cantilever and cantilever tip extensions (see e.g. the cantilever dimensions given with respect to figures 2(a) and 2(b)).

If, in the orientation shown in Figure 1e, the cantilever tip would be assembled on the side opposite the side where the gold reflector pad is arranged, i.e., on the top side of the cantilever in Figure 1e, no useful cantilever assembly could be produced. In fact such a cantilever assembly would be inoperable. In particular, the 300 μm thick cantilever support extending from this cantilever top side of Figure 1e would completely block the desired sampling function of the cantilever tip which would then extend from the cantilever top side only by the typical tip length in the order of nanometers. The 300 μm thick cantilever support would block the cantilever tip from being positioned sufficiently near to the sample to be scanned by the cantilever tip. This problem would become even more serious when decreasing the length of the cantilever from the typical lengths used in Kajimura to the decreased lengths used in Viani.

Going back to the Office's assertion in the paragraph bridging pages 9 and 10, namely that it appears

"that the reflector pad do not face the sample as alleged by Applicant and further the examiner is not aware of any cantilevers that have this supposed arrangement. In either case, the references to Kitamura et al. and Viani et al. both disclose application of a reflection pad on the cantilever which is on the opposite side of the cantilever from the attachment of the cantilever tip."

Applicants respectfully submit that it is quite common that in cantilever assemblies having a construction like that of Figure 1e of Viani, the cantilever tip is in fact assembled on the gold reflector pad, and thus on the same side on which the reflector pad is arranged.

In fact, such an arrangement results in a useful and operable cantilever assembly, since the cantilever tip extends from the reflector pad at the bottom side of the cantilever of Figure 1e (which may also be called the cantilever tip side or front side, i.e., the side opposite the backside where the cantilever is attached to its thick support). Such an arrangement of the cantilever tip ensures that its function is not obstructed by the thick support as the tip freely extends from the reflector pad in the direction opposite the side of the thick support.

Applicants note that this placement of the cantilever tip on the gold reflector pad does not hinder the reflector pad to fulfill its light reflection function, as the Office seems to suggest: The tip may not need the whole surface area of the reflector pad so that a remaining portion of the reflector pad would be able to reflect light coming from the front (sample side) of the cantilever assembly. If in corresponding appliances there is not enough space to arrange the light source and light receiving means at the same (front) side where the sample to be scanned is positioned, no problems ensue since the cantilever arm is usually, and as shown in Viani, made from light transparent material. In such cases, the light may shine on the reflector pad from the backside of the cantilever, where it passes through the transparent cantilever arm before being reflected at the backside of the reflector pad to pass again through the transparent cantilever arm and then being directed to a light receiving means arranged at the backside of the cantilever.

These facts about Viani's disclosure are indeed confirmed by Figures 2(a) and 2(b) and the Viani's description thereof. In particular, Figure 2(a) is said to show a top view on two cantilevers with integrated reflector pads, where at the left side of the two cantilever arms (oriented to extend from the left to the right in Figure 2(a)) are attached to a support. This top side of Figure 2(a) thus corresponds to the bottom side of Figure 1e. Figure 2(b) also shows basically a top view (even though it is modified to be a perspective view). The fact that on the right side of Figure 2(b) the cantilever arms can be seen to extend on their support is a clear indication that it is in fact a top perspective view. Now, the cantilever tips are clearly seen in Figure 2(b) to be arranged on said top side which corresponds to the bottom side of Figure 1e. The cantilevers of Figure 2(b)

are said to be embodiments without pads which means that in this case the cantilever tip is assembled directly on the cantilever arm without a reflector pad in between. But irrespective of whether a reflector pad is provided or not, the cantilever tip is assembled on that side of the cantilever which is opposite to the side where the cantilever is attached to the cantilever support. That means the cantilever tip is assembled on the bottom side of the cantilever of Figure 1e (whether a reflector pad is arranged there or not).

In sum, applicants have shown above that Viani exclusively and consistently discloses to provide the cantilever tip on the same side as the reflector pad, i.e., that the tip and the reflector pad are both arranged on that side of the cantilever which is opposite the side at which the cantilever is attached to its support. The side where the pad and the tip are attached can be called the front side, and the opposite side where the support is arranged can be called the backside of the cantilever.

Thus, the applicants successfully refuted the Office's counter to applicants argument that Kajimura cannot be combined with Viani. The Office is directed at the discussion starting on page 9 of applicants' response filed on August 6, 2010, which details the consequences of the scaling down and explains that the production process associated with scaling down the cantilever size entails a rearrangement of the reflector pad to the "front side" cantilever as taught by Viani.

In addition, assuming the Office should take the position that Viani could be modified so that the reflector pad is positioned at the back side facing away from the sample, applicants submit that this arrangement would, as discussed above, render Viani unsatisfactory for its intended purpose, which is a well established indicator of non-obviousness (MPEP 2143.01).

With regard to the rejections of claims 14, 15 and 20 under 35 U.S.C. 103(a) which are rejected as being unpatentable over Kajimura in view of Viani as applied to claim 10, and further in view of US 5,319,961 (Matsuyama et al., hereinafter "Matsuyama"), the

rejection of claim 18 which is rejected under 35 U.S.C. 103(a) as being unpatentable over Kajimura in view of Viani as applied to claim 10 and further in view of US Patent 5,653,912 to Matsuyama et al. (Matsuyama '912), the rejection of claim 19 which is rejected under 35 U.S.C. 103(a) as being unpatentable over Kajimura in view of Viani as applied to claim 10 above, and further in view of US 6,365,895 (Yamamoto) or Watanabe, the Office is directed to the argument set forth in connection with claim 10. The Office has not explained how the additional references cure the deficiencies outlined in this context, and applicants respectfully submit that they in fact do not cure these deficiencies.

For the rejection of claim 27 under 35 U.S.C. 103(a) as being unpatentable over US Watanabe in view of Kajimura, the Office is directed to the deficiencies of Watanabe, which have been discussed above. Applicants respectfully submit that Kajimura does not cure these deficiencies.

Applicants submit that the above shows that all remaining rejected claims are patentable over the art cited. An early issuance of a notice of allowance is respectfully requested. If any issue remains, the Office is urged to call the undersigned at 301-657-1282 for a speedy resolution.

The Commissioner is authorized to charge any fee deficiencies and overpayments to deposit account number 50-3135.

Respectfully submitted,

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